Section's "TIP Project Analysis Guidelines" were also utilized. The analysis of unsignalized and signalized intersections was completed utilizing Synchro Version 7 analysis software, which is based on the HCM methodologies. The roundabouts within the project study area were analyzed using Sidra. The analysis includes the evaluation of Level of Service (LOS) for the 2008 Existing Conditions, the 2030 No-Build Conditions, the 2035 No-Build Conditions, as well as the Build Conditions for both 2030 and 2035.

2.4.3.1 Design Level of Service

The procedures used to define the operational qualities of the roadways are based on the concepts of capacity and LOS as set forth in the HCM. The LOS is defined with letter designations from A to F, as shown in Table 1. LOS A represents the best operating conditions along a road or at an intersection, while LOS F represents the worst conditions. The minimum acceptable LOS for the design year 2030 was determined to be LOS D, based on the American Association of State Highway Transportation Officials (AASHTO) guidelines for a collector facility within urban and suburban areas.

Table 1: Level of Service Definitions

Level of Service	Signalized Intersections	Road Segments
A	Very low delay (<10.0 seconds per vehicle). Most vehicles do not have to stop at all.	Free flow. Individuals are unaffected by other vehicles and operations are constrained only by roadway geometry and driver preferences. Maneuverability within traffic stream is good. Comfort level and convenience are excellent.
B	10.0-20.0 second delay. Good progression and short cycle length.	Free flow, but the presence of other vehicles begins to be noticeable. Average travel speeds are the same as in LOS A, but there is a slight decline in freedom to maneuver and level of comfort.
C	20.1 to 35.0 second delay. Fair progression and/or longer cycles. The number of vehicles stopping is significant.	Influence of traffic density on operations becomes marked. The ability to maneuver within the traffic stream is clearly affected by other vehicles. Multi-lane highways with a free flow speed (FFS) above 50 miles per hour (mph), the speeds reduce somewhat. Minor disruptions can cause serious local deteriorations and queues will form behind any significant traffic disruption.
D	35.1 to 55.0 second delay. Many vehicles stop. Individual cycle failures are noticeable.	The ability to maneuver is severely restricted due to traffic congestion. Travel speed is reduced by the increasing volume. Only minor disruptions can be absorbed without extensive queues forming and the service deteriorating.
E	55.1 to 80.0 second delay. Individual cycle failures are frequent.	Operating conditions at or near the capacity level, usually unstable. The densities vary, depending on the FFS. Vehicles are operating with the minimum spacing for maintaining uniform flow. Disruptions cannot be dissipated readily. Most multilane highways with FFS between 45 and 60 mph vehicle mean speeds at capacity range from 42 to 55 mph, but are highly variable and unpredictable.
F	Delay in excess of 80.0 seconds. Considered unacceptable to most drivers.	Breakdown flow. Traffic is over capacity at points. Queues form behind such locations, which are characterized by extremely unstable stop-and-go waves. Travel speed within queues are generally less than 30 mph.

Source: Transportation Research Board, 2000.